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A GRANULAR HERBICIDE DISTRIBUTOR FOR SMALL EXPERIMENTAL PLOTS

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A GRANULAR HERBICIDE DISTRIBUTOR FOR SMALL EXPERIMENTAL PLOTS

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One of the critical necessities for conducting granular herbicide research is an efficient distributor for small plot experiments. The hand-propelled distributor described meets the requirements of accuracy and convenience. An operational unit is shown in Figure 1.

The basic metering device is an auger that turns in an aluminum tube slotted alternately on the top and bottom (Figures 2 and 3). This metering principle was used successfully in a tractor-drawn distributor described by Danielson and Chambers. 2/ Dimensions of the slotted tube and auger prevent gravitational flow of the granules and delivery is therefore precise.

Broadcast and band applications are made with this distributor. Bands are applied by inserting expandable separators and filling the selected portions of the hopper with granules (Figures 3 and 4). Directed band applications on established crops are made by attaching flexible tubes to the hopper in conjunction with the use of the separators. The hopper is adjustable to various heights required for pre- and post-emergence treatments. Rates of application are varied by changing the size of the sprocket on the auger. A length of house eave-trough is used to collect the granules for calibration of the distributor.

PERFORMANCE DATA

The distributor, with an auger and slotted tube of the dimensions given here, delivers 15-30 and 30-60 mesh attapulgit granules at precise rates when the speed of operation is constant (Table 1). The variation in rate of delivery is approximately 5 and 6 percent for 30-60 and 15-30 mesh granules, respectively, within the range of acceptable walking speeds of 1 to 3 miles per hour.

Pyrophyllite and diatomaceous earth granules can be applied accurately with this distributor. Changing the depth and width of the auger spiral would permit the application of large particles of vermiculite and materials of a similar size and texture.

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2/ Danielson, L. L. and Chambers, P. P. A field distributor for granular herbicide trials. Weeds 5(2):108-111. 1957.

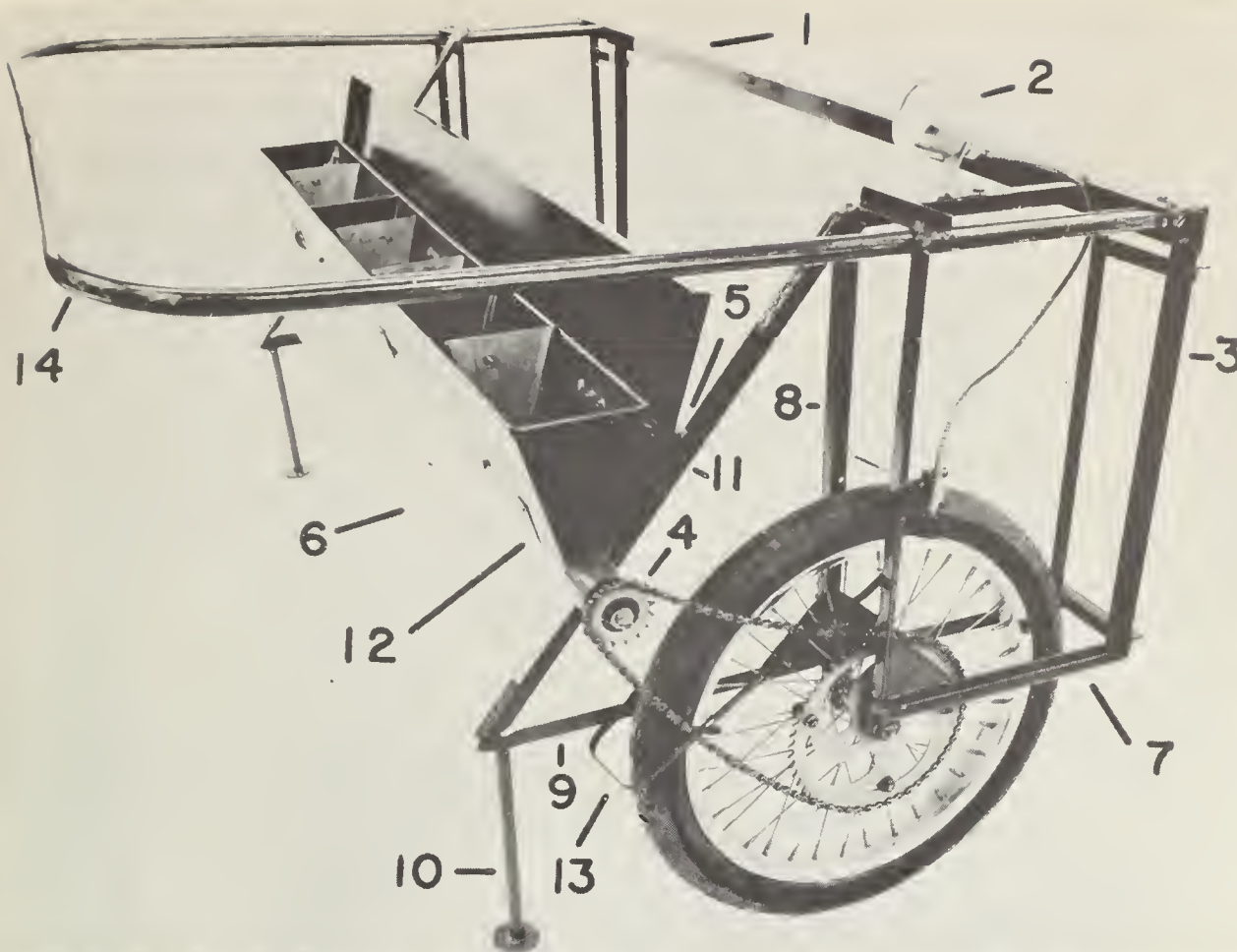


Figure 1.--Hand-propelled granular herbicide distributor with hopper set at intermediate height.

CONSTRUCTION DETAILS

The frame was constructed to carry the granule distributor and/or an experimental plot sprayer. It may be easily changed to suit specific requirements. Steel was used to construct this model but aluminum could be used to advantage.

Frame - Wheel stalls of frame made of $\frac{3}{4}$ x $\frac{1}{8}$ inch angle iron. Height $20\frac{1}{2}$ inches. Slanting vertical $25\frac{1}{2}$ inches. Long horizontal 27 inches. Separation of verticals for wheel space $3\frac{3}{4}$ inches. (See Figure 1, items 3, 11, 9, 7, respectively.)

Horizontal angle iron connecting wheel stalls of frame $\frac{1}{8}$ x 2 x 60 inches. (See Figure 1, item 1.)

Handle - 1-inch electric conduit. Side length 39 inches. Crossbar length $58\frac{1}{2}$ inches outside. (See Figure 1, item 14.)

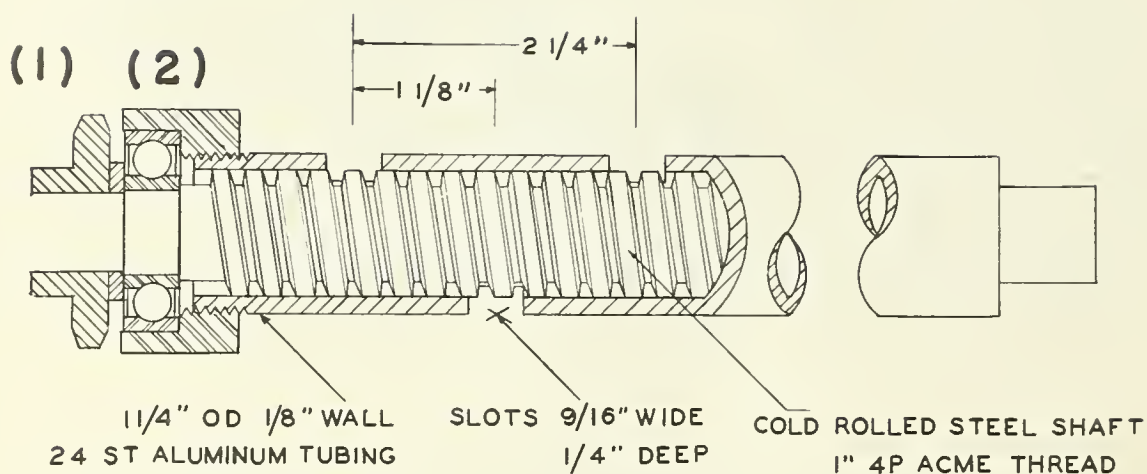


Figure 2.--Diagram of auger and slotted tube used as metering device in granular herbicide distributor. (1) Sprocket. (2) Ball-bearing and housing.

Stand - 1/2-inch iron rod 10 inches long with 2-inch washer welded to the bottom end. (See Figure 1, item 10.)

Hopper - 18 guage sheet metal. Height 7 inches. Top width 5 inches. Bottom width 1-1/4 inches. Bottom edges of ends of hopper are shaped to fit the slotted auger-tube. (See Figures 1 and 4.)

Hopper Lid - Sheet metal of same guage as hopper. Length 52 inches. Width 5-3/4 inches. Edge turned 7/8 inch. (See Figures 1 and 4.)

Wedge-Shaped Wood Block - to attach hopper to frame. Two legs of right angle 2-3/8 inches and 5-1/4 inches. Hypoteneuse 5-5/8 inches. Block 2 inches thick. Two 1/4-inch stove bolts project through the hopper, block, and frame. (See Figure 1, item 5.)

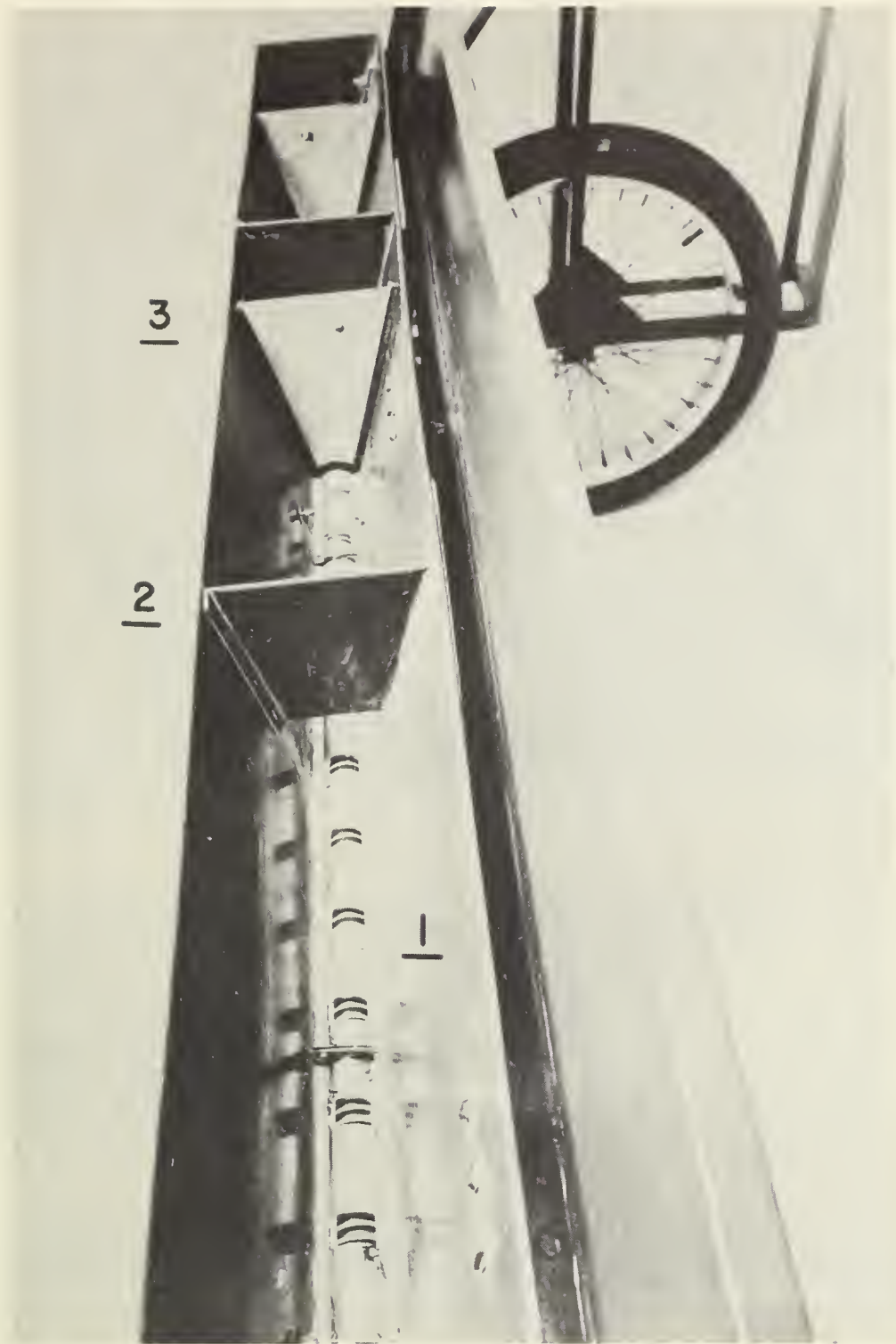


Figure 3.--Interior of hopper showing slotted auger-tube and auger.
(1) Auger and tube. (2) Permanent brace. (3) Removable
separator for band placement.

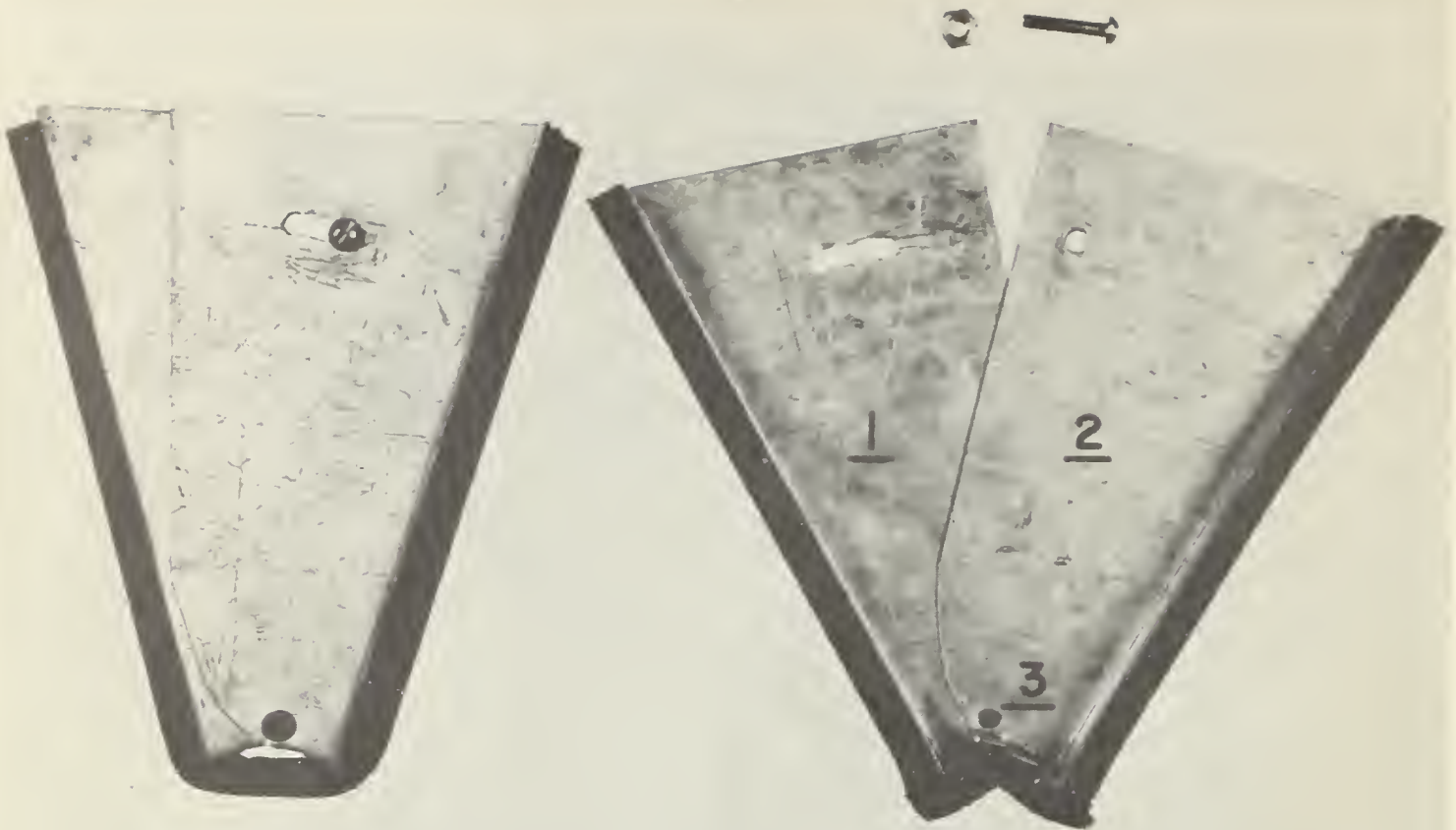


Figure 4.--Removable separators used for band placement showing individual parts and point of assembly.

Hopper Partitions for Band Application - Each part $3\text{-}\frac{1}{4}$ inches wide at top and $\frac{3}{4}$ inch wide at the bottom with a length of 6 inches. Bottom edge shaped to fit auger-tube. Bottom and outside edge turned $\frac{1}{2}$ inch. Sponge rubber weather stripping is glued to edge. (See Figures 3 and 4. See two sides, items 1 and 2 and rivet item 3.)

Metal Bands - holding hopper to slotted auger-tube. Length 5 inches. Width 1 inch. Held in place with 2 stove bolts. Three bands are used. (See Figure 1, item 12.)

Splash Pan - Sheet metal guage 18. Width 6 inches. Length $51\text{-}\frac{1}{2}$ inches. (See Figure 1, item 6.)

Slotted Auger-tube - $1\text{-}\frac{1}{4}$ inch OD 24 ST aluminum tubing with $\frac{1}{8}$ inch wall. Length $53\text{-}\frac{1}{2}$ inches. 1 inch of ends threaded on outside to receive bearing cap. Bearing may be made of nylon or other flexible plastic. (See Figures 2 and 3.)

Auger - Cold rolled steel shaft. 1 inch 4P Acme thread. Overall length 57-1/2 inches. Bearing section 2-1/8 inches on each end. Sprocket section 1-1/8 inches. Clearance between the auger and slotted tube is not critical and sufficient space should be allowed for the auger to turn freely.

Small Sprocket - 16-tooth sprocket, diameter 2-3/4 inches, threaded on fitting machined for auger shaft. (See Figure 1, item 4.)

Large Sprocket - 52-tooth sprocket, diameter 8-1/2 inches, machined to mount on hub of wheel and bolted to spokes. (See Figure 1.)

Chain - Standard bicycle chain.

Chain Guide - Strap iron 3/16 x 1/2 x 24 inches. (See Figure 1, item 13.)

Wheels - 20-inch heavy duty bicycle wheels. (See Figure 1.)

Speedometer - Bicycle speedometer fitted with rubber stopper sanded to correct size to give 1 to 10 ratio on dial. (See Figure 1, item 2.)

Table 1. Calibration of granular herbicide distributor at various speeds.

Granular carrier	Amount delivered, pound per acre			
	1	2	3	4
	<u>mph</u>	<u>mph</u>	<u>mph</u>	<u>mph</u>
Uncalcined attapulгите 15-30 mesh	37.9 ± 0.1	37.8 ± 0.2	35.8 ± 0.2	33.9 ± 0.3
Uncalcined attapulгите 30-60 mesh	43.3 ± 0.1	42.3 ± 0.1	41.3 ± 0.1	39.9 ± 0.1

SUMMARY

A hand-propelled granular herbicide distributor is described. The basic metering device is an auger that turns in a tube slotted alternately at the top and bottom. These slots are feeding and delivery slots, respectively. Rate of delivery is uniform at constant speeds and varies slightly in a speed range of 1 to 3 mph. Overall and band applications can be made. The distributor can be constructed in many different ways to meet the specific needs of different research problems. Performance data and details of construction are given.

Prepared in

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